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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.** 10/662,394	**Applicant(s)** AKIYAMA ET AL.	
	Examiner DANNY W. LEUNG	**Art Unit** 2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 May 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Chung et al.** *(US006813021B2)*.

Regarding claim 15, **Chung** discloses a method of monitoring a signal to noise ratio of a signal transmitted in an optical system, comprising: determining a signal to noise ratio of the optical signal based on a measured value of a degree of polarization of said optical signal *(col 7, ln 22-31, "the OSNR is 25dB, while the linear polarizer rotates by an angle of 2.4 degrees, the quarter-wave plate must rotate by 360 degrees so that it linearly polarizes an arbitrarily polarized optical signal inputted...)*. **Chung** further teaches determining a signal to noise ratio by using a linear interpolation method *(col 8, ln 14-22)*. **Chung** does not disclose expressly determining a change amount in the signal to noise ratio. **However**, it would have been obvious to a person of ordinary skill in the art from the same field of endeavor to realize that the method of linear interpolation of signal to noise ratio requires first determining a change amount in the signal to noise ratio, therefore, it would have been obvious for a person of ordinary skill in the art at the time when the invention was made to determine a change amount in the signal to noise ratio of the optical signal, during **Chung's** process of linear interpolation, based on a measured value of a degree of polarization of said optical signal as taught by **Chung**, and the result would have been predictable, since the step of determining a change amount in the signal to noise ratio is a common and well known step in performing linear interpolation of signal to noise ratio.

3. Claims 1, 3-6, 12, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Chou et al.** *(US006859268B2)*, in view of **Chung et al.** *(US006813021B2).*

Regarding claims 1, 4, and 15, **Chou** discloses an optical transmission system *(fig 1)* in which an optical signal is transmitted from an optical transmission apparatus *(15, fig 1)* to an optical receiving apparatus *(240, fig 1)* via an optical transmission path *(22, fig 1)*, comprising:

a degree of polarization measurement section *(110, fig 1)* that measures a degree of polarization of said optical signal *(col 7, ln 13-28)*; and the stores an initial value of said degree of polarization of said optical signal *(col 9, ln 8-32)*, and determines a change amount in a measured value of the degree of polarization obtained in said degree of polarization measuring section relative to said stored initial value *(col 7, ln 44-col 8, ln 8)*. **Chou** further teaches PMD analysis may be performed from the measurement of degree of polarization *(col 7, ln 13-col 8, ln 34)*. **Chou** does not disclose expressly wherein the system comprising an optical SNR calculation section that determines a change amount in an optical signal to noise ratio of said optical signal based on a measured value of the degree of polarization obtained in said degree of polarization measuring section. **Chung**, from the same field of endeavor, teaches an optical SNR calculation section that determines a change amount in an optical signal to noise ratio of said optical signal based on a measured value of the degree of polarization obtained in said degree of polarization measuring section *(as discussed above regarding claim 15, Chung teaches a OSNR interpolation method (col 8, ln 14-22), which requires measuring a change amount in an optical signal to noise ratio of said optical signal. Chung also teaches that the determining of OSNR is based on a measured value of a degree of polarization of said optical signal (col 7, ln 22-31))*. Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to

apply **Chung's** optical SNR calculation technique onto **Chou**'s system, such that **Chou's** computer 120 acts as an optical SNR calculation section that determines a change amount in an optical signal to noise ratio of said optical signal based on a measured value of the degree of polarization obtained in said degree of polarization measuring section as suggested by **Chung**.

Furthermore, it would have been obvious for a person of ordinary skill in the art at the time of invention to recognized that applying a known technique such as that of **Chung's** onto **Chou's** base device/method/system upon which the claimed invention can be seen as an "improvement" would have yielded predictable results and resulted in an improvement system, since **Chung's** teaching is capable of enhancing performance of OSNR measurement accuracy.

Therefore, the rationale of applying a known technique (**Chung's**) to a known device/method/system (**Chou's**) ready for improvement to yield predictable results has been clearly articulated herein with the *Graham* inquiries and findings as presented above. In *Dann v. Johnston* 525 U.S. 219, 189 USPQ257 (1976) The Court held that "[t]he gap between the prior art and respondent's system is simply not so great as to render the system nonobvious to one reasonable skilled in the art."

As to claim 3, **Chou** further teaches wherein when the measured value of said degree of polarization exceeds said initial value, the measured value is set as said initial value *(col 14, ln 48-61, "Each data point can be used to increment a matrix, M, with very few floating operations by continuously updating M to include new data and throw out old data").*

As to claim 5, **Chou** further discloses wherein said degree of polarization measurement section measures the degree of polarization of an optical signal propagated through said optical

transmission path to be input to said optical receiving apparatus *(col 5, ln 12-42 polarimeter 110 measure DOP of optical signal along path 160, which is to be input to receiver 240).*

As to claim 6, **Chou** further discloses an optical transmission system according to claim 4, further comprising:

at least one optical repeater *(100, fig 1)* on said optical transmission path, wherein,

when an optical signal sent from said optical transmission apparatus is transmitted through a plurality of repeating intervals *(100 and 200, fig 1)* to be received by said optical receiving apparatus *(240, fig 1)*,

said degree of polarization measurement section measures the degree of polarization of at least one optical signal among an optical signal output from said optical transmission apparatus each optical signal propagated through each repeating intervals and an optical signal input to said optical receiving apparatus *(col 5, ln 56-67).*

Regarding claim 12, **Chou** teaches An optical transmission system comprising:

an automatic polarization mode dispersion compensation apparatus *(700, fig 9)* including

a polarization mode dispersion compensator *(750, fig 9)* compensating for polarization mode dispersion generated in said optical signal *(col 11, ln 19-28)*,

a degree of polarization measuring device *(770, fig 9)* measuring the degree of polarization of an optical signal whose polarization mode dispersion has been compensated by said polarization mode dispersion compensator *(col 11, ln 29-41),* and

a control circuit *(780, fig 9)* controlling a compensation amount in said polarization mode dispersion compensator *(col 11, ln 41-47)*, based on the measured value of the degree of

polarization obtained by the degree of polarization measuring device in said automatic polarization mode dispersion compensation apparatus *(col 11, ln 29-53)*.

Chou further teaches PMD analysis may be performed from the measurement of degree of polarization *(col 7, ln 13-col 8, ln 34)*. **Chou** does not disclose expressly wherein the system comprising an optical SNR calculation section that determines an optical signal to noise ratio of said optical signal based on a measured value of the degree of polarization obtained in said degree of polarization measuring section.

Chung, from the same field of endeavor, teaches an optical SNR calculation section that determines a change amount in an optical signal to noise ratio of said optical signal based on a measured value of the degree of polarization obtained in said degree of polarization measuring section *(as discussed above regarding claim 15, Chung teaches a OSNR interpolation method (col 8, ln 14-22), which requires measuring a change amount in an optical signal to noise ratio of said optical signal. Chung also teaches that the determining of OSNR is based on a measured value of a degree of polarization of said optical signal (col 7, ln 22-31))*. Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to apply **Chung's** optical SNR calculation technique onto **Chou**'s system, such that **Chou's** computer 120 acts as an optical SNR calculation section that determines a change amount in an optical signal to noise ratio of said optical signal based on a measured value of the degree of polarization obtained in said degree of polarization measuring section as suggested by **Chung**.

Furthermore, it would have been obvious for a person of ordinary skill in the art at the time of invention to recognized that applying a known technique such as that of **Chung's** onto **Chou's** base device/method/system upon which the claimed invention can be seen as an

"improvement" would have yielded predictable results and resulted in an improvement system, since **Chung's** teaching is capable of enhancing performance of OSNR measurement accuracy.

Therefore, the rationale of applying a known technique **(Chung's)** to a known device/method/system **(Chou's)** ready for improvement to yield predictable results has been clearly articulated herein with the *Graham* inquiries and findings as presented above. In *Dann v. Johnston* 525 U.S. 219, 189 USPQ257 (1976) The Court held that "[t]he gap between the prior art and respondent's system is simply not so great as to render the system nonobvious to one reasonable skilled in the art."

Regarding claim 16, **Chou** discloses a method of monitoring a signal transmitted via an optical fiber *(fig 9),* comprising:

correcting a received signal by compensating for a polarization mode dispersion of the signal along the optical fiber *(col 11, ln 1-19, CPU 720 continuously monitors DOP value calculated by CPU 780 to determine delay needed at 760 to compensate for PMD);*

splitting a part of the signal which has been corrected for polarization mode dispersion *(fig 9 signal from delay module 760 is split to the receiver and the polarimeter)*; and

measuring a degree of polarization of the part of the signal *(fig 9, polarimeter 770),* and comparing the measured degree of polarization with a reference value of the degree of polarization to monitor a change in DOP *(col 11, ln 10-19),* wherein if the measured degree of polarization exceeds the reference value, the reference value is set equal to the measured degree of polarization, and the measured degree of polarization is also used to control the compensating for the polarization mode dispersion *(col 11, ln 19-53, CPU detects a decrease in DOP, and*

determine a new trailing PSP, a reference value, and it is used to determine the PMD time delay, which is used for compensate for PMD).

Chou does not disclose expressly wherein the comparing the measured degree of polarization with a reference value of the degree of polarization is to monitor a change of the signal to noise ratio. **Chung**, from the same field of endeavor, teaches an optical SNR calculation section that determines a change amount in an optical signal to noise ratio of said optical signal based on a measured value of the degree of polarization obtained in said degree of polarization measuring section *(as discussed above regarding claim 15, Chung teaches a OSNR interpolation method (col 8, ln 14-22), which requires measuring a change amount in an optical signal to noise ratio of said optical signal. Chung also teaches that the determining of OSNR is based on a measured value of a degree of polarization of said optical signal (col 7, ln 22-31)).* Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to apply **Chung's** optical SNR calculation technique onto **Chou**'s system, such that **Chou's** CPU 780 acts as an optical SNR calculation section that determines a change amount in an optical signal to noise ratio of said optical signal based on a measured value of the degree of polarization obtained in said degree of polarization measuring section as suggested by **Chung**.

Furthermore, it would have been obvious for a person of ordinary skill in the art at the time of invention to recognized that applying a known technique such as that of **Chung's** onto **Chou's** base device/method/system upon which the claimed invention can be seen as an "improvement" would have yielded predictable results and resulted in an improvement system, since **Chung's** teaching is capable of enhancing performance of OSNR measurement accuracy.

Therefore, the rationale of applying a known technique **(Chung's)** to a known device/method/system **(Chou's)** ready for improvement to yield predictable results has been clearly articulated herein with the *Graham* inquiries and findings as presented above. In *Dann v. Johnston* 525 U.S. 219, 189 USPQ257 (1976) The Court held that "[t]he gap between the prior art and respondent's system is simply not so great as to render the system nonobvious to one reasonable skilled in the art."

4. Claims 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Chou et al.** *(US006859268B2)*, in view of **Chung et al.** *(US006813021B2)*, as applied to claim 4 above, and further in view of **Fatehi et al.** *(US006512612B1)*.

Regarding claim 7, **the combination of Chou and Chung** discloses the system in accordance to claim 4 as discussed above. **Chou** further discloses wherein a plurality of optical signals is transmitted, and said degree of polarization measurement section measure the degrees of polarization of the respective optical signals *(col 5, ln 13-23)*. **The combination of Chou and Chung** does not disclose expressly having wavelength division multiplexed light containing a plurality of optical signals with different wavelengths. **Fatehi**, from the same field of endeavor, teaches an optical transmission system, where a wavelength division multiplexed light containing a plurality of optical signals with different wavelengths is transmitted *(col 3, ln 61-col 4, ln 4)*, and a section *(250, fig 5)* that measures properties of the optical signals of respective wavelengths contained in said wavelength division multiplexed light *(col 9, ln 62-col 10, ln 21)*.

Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to transmit a wavelength division multiplexed light containing a plurality of optical signals, as taught by **Fatehi**, onto **the combination of Chou and Chung's** system with SNR

calculation section and a polarization measurement section, such that **the combination of Chou and Chung's** degree of polarization measurement section measures the degrees of polarization of optical signals of respective wavelengths contained in said wavelength division multiplexed light, and **the combination of Chou and Chung's** optical signal to noise ratio calculation section determines optical signal to noise ratios corresponding to respective wavelengths, based on measured values of the degrees of polarization obtained by said degree of polarization measurement section as discussed above regarding claim 4. The motivation for doing so would have been to increase the bandwidth of signal transmission while maintaining signal quality by transmitting a wavelength division multiplexed light containing a plurality of optical signals and measuring the noise of the respective signals accordingly.

As to claim 8, **Chou** further discloses wherein said degree of polarization measurement section and said optical signal to noise ratio calculation section are provided in plural number *(101 and 200, fig 1, also see 116a, 117a, and 119a, fig 2)*. It would be obvious for a person of ordinary skill in the art to use such degree of polarization measurement section and said optical signal to noise ratio calculation section provided in plural number as suggested by **Chou** for each of the optical signals of respective wavelengths contained in said wavelength division multiplexed light in **the combination of Chou, Chung, and Fatehi's** system. The motivation for doing so would have been to be able to detect signal quality in each of the individual channels.

Claim 9 is rejected for the same reasons as stated above regarding claim 7, because in addition to the limitations in claim 7, **Chou** further teaches a selection section that selects one optical signal from the optical signals to be measured *(col 5, ln 56-col6, ln 5, "beam splitters*

114, 116, 117, and mirror 119 couple optical signals propagating along beam path 112 towards detector modules 114a, 116a, 117a, 119a respectively... Each detector module measures specific optical properties of the optical signal..."). **Fatehi** further teaches a selection section that selects one optical signal from the optical signals to be measured *(col 11, ln 35-51).* It would have been obvious to combine **Chou, Chung,** and **Fatehi** for the same reason as stated regarding claim 7, such that a selection section, such as that of **Chou's or Fatehi's**, selects one optical signal from the optical signals of respective wavelengths contained in **the combination of Chou, Chung, and Fatehi's** wavelength division multiplexed light, wherein said degree of polarization measurement section measures the degree of polarization of an optical signal selected by said selection section, and said optical signal to noise ratio calculation section determines an optical signal to noise ratio of the optical signal selected by said selection section, based on the measured value of the degree of polarization obtained by said degree of polarization measurement section as discussed above regarding claim 7.

As to claim 10, **Fatehi** further discloses said selection section *(250, fig 5)* includes a demultiplexer *(202, fig 5)* demultiplexing said wavelength division multiplexed light according to wavelength, and an optical switch selecting one optical signal out of the optical signals of respective wavelengths demultiplexed by said demultiplexer *(col 11, ln 35-51).* Therefore, it would be obvious for a person of ordinary skill in the art to feed such signal from **Fatehi**'s selection section it to **the combination of Chou, Chung, and Fatehi's** degree of polarization measurement section as discussed above regarding claim 9. The motivation for doing so would have been to reduce cost by only measuring a selected portion of the signals.

5. Claim 11 rejected under 35 U.S.C. 103(a) as being unpatentable over **Chou et al.** *(US006859268B2)*, in view of **Chung et al.** *(US006813021B2)*, further in view of **Fatehi et al.** *(US006512612B1)*, as applied to claim 9 above, and further in view of **Suzuki** *(US006154273A)*.

Regarding claim 11, **the combination of Chou, Chung, and Fatehi** discloses the method in accordance to claim 9 as discussed above. **It** does not disclose expressly wherein said selection section includes a variable wavelength optical filter extracting an optical signal of one wavelength from said wavelength division multiplexed light, to feed it to said degree of polarization measurement section. **Suzuki**, from the same field of endeavor, teaches an optical transmission system having a selection section includes a variable wavelength optical filter *(62, 64, fig 12)* extracting an optical signal of one wavelength from a wavelength division multiplexed light, to feed it to a measurement section *(col 13, ln 35-62)*. Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to use a variable wavelength optical filter such as that of **Suzuki**'s onto **the combination of Chou, Chung, and Fatehi**'s system to extract an optical signal of one wavelength from said wavelength division multiplexed light, to feed it to said degree of polarization measurement section. The motivation for doing so would have been to reduce complexity of the measuring system by using a variable wavelength optical filter to eliminate signals that are not being measured.

6. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Chou et al.** *(US006859268B2)*, in view of **Chung et al.** *(US006813021B2),* as applied to claim 4 above, and further in view of **Eder et al.** *(US006885820B2)*.

Regarding claim 13, **the combination of Chou and Chung** discloses the system in accordance to claim 4 as discussed above. **Chou** further discloses the system further comprising: a control section *(220, fig 1)* controlling the optical signal so that the optical signal to noise ratio of the optical signal received by said optical receiving apparatus is a previously set value. **The combination** does not disclose expressly a control section controlling a power of an optical signal output from said optical transmission apparatus, based on the optical signal to noise ratio determined by said optical signal to noise ratio calculation section, so that the optical signal to noise ratio of the optical signal received by said optical receiving apparatus is a previously set value. **Eder**, from the same field of endeavor, teaches a control section *(OSNR controller, fig 1)* controlling a power of an optical signal output from said optical transmission apparatus *(col 7, ln 41-47)*,

based on the optical signal to noise ratio determined by a optical signal to noise ratio calculation section *(col 7, ln 19-47, OSNR signal controls the adjustable attenuators VOA2 and VOAn, which controls the power of optical output of the transmitter)*,

so that the optical signal to noise ratio of the optical signal received by said optical receiving apparatus is a previously set value *(col 7, ln 42-54)*. Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to apply a control section controlling the power of an optical signal output from the combination of Chou and Chung's transmission apparatus, based on the optical signal to noise ratio determined by the combination of Chou and Chung's signal to noise ratio calculation section, so that the optical signal to noise ratio of the optical signal received by said optical receiving apparatus is a previously set value as

taught by **Eder**. The motivation for doing so would have been to achieve the optimum optical signal to noise ratio by adjusting transmission power.

As to claim 14, **Eder** further discloses wherein, when a wavelength division multiplexed light containing a plurality of optical signals with different wavelengths is transmitted *(col 7, ln 1-14)*,

said control section performs a pre-emphasis control of the optical signal power of each wavelength output from said optical transmission apparatus *(col 7, ln 41-54)*,

based on the optical signal to noise ratio corresponding to each wavelength determined by said optical signal to noise ratio calculation section *(col 7, ln 14-36)*.

Response to Arguments

7. Applicant's arguments filed 5/16/2008 have been fully considered but they are not persuasive.Applicant's arguments with respect to claims 1, 3-15 have been considered but are moot in view of the new ground(s) of rejection.

8. Applicant argues that **Chung's** method does not determine "a change amount in the signal to noise ratio of the optical signal based on a measured value of a degree of polarization of said optical signal". However, it is noted that **Chung** also teaches a method of interpolation to determine the OSNR, in which a step of measuring the change in OSNR is required as it is common and well known. It would have been obvious for a person of ordinary skill in the art at the time when the invention was made to use **Chung's** method to measure a change in OSNR if **Chung's** system is capable of performing interpolation.

Conclusion

9. The prior art made of record in previous action(s) and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANNY W. LEUNG whose telephone number is (571)272-5504. The examiner can normally be reached on 11:30am-9:00pm Mon-Thur.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DANNY W LEUNG
Examiner
Art Unit 2613

/D. W. L./
Examiner, Art Unit 2613
9/16/2008

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